Naval Research Laboratory
Stennis Space Center, MS 39529-5004

Software Requirements Specification of National Imagery and Mapping Agency Mapping, Charting, and Geodesy Utility Software Environment (NIMAMUSE) Fusion V2.1

JERRY L. LANDRUM

Mapping, Charting, and Geodesy Branch
Marine Geosciences Division

SUSAN H. RAMSEY

Planning Systems Incorporated
Slidell, LA

June 25, 1998

19990809 019

DTIC QUALITY INSPECTED 4

REPORT DOCUMENTATION PAGE

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE June 25, 1998	3. REPORT TYPE AND DATES COVERED Final

4. TITLE AND SUBTITLE
Software Requirements Specification of National Imagery and Mapping Agency Mapping, Charting, and Geodesy Utility Software Environment (NIMAMUSE) Fusion V2.1

6. AUTHOR(S)

Jerry L. Landrum and Susan H. Ramsey*

5. FUNDING NUMBERS

Job Order No.   574M12008

Program Element No.

Project No.

Task No.

Accession No.

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

Naval Research Laboratory
Marine Geosciences Division
Stennis Space Center, MS 39529-5004

8. PERFORMING ORGANIZATION REPORT NUMBER

NRL/MR/7441--98-8088

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

National Imagery and Mapping Agency
8613 Lee Hwy.
Fairfax, VA 22031-2137

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

Planning Systems Incorporated, 115 Christian Lane, Slidell, LA 70458

12a. DISTRIBUTION/AVAILABILITY STATEMENT

Approved for public release; distribution unlimited

12b. DISTRIBUTION CODE

13. ABSTRACT (Maximum 200 words)

NIMAMUSE Fusion V2.1 is a computer mapping software program produced by the Naval Research Laboratory for the National Imagery and Mapping Agency (NIMA). In addition to demonstrating the NIMA digital map data products, coordinate conversions, and datum transformations, Fusion provides general purpose mapping capabilities for managing user data, route planning, and route monitoring. This report presents the software requirements for Fusion V2.1.

14. SUBJECT TERMS

maps, NIMAMUSE, data fusion

15. NUMBER OF PAGES
14

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
Unclassified	Unclassified	Unclassified	SAR

SOFTWARE REQUIREMENTS SPECIFICATION OF NATIONAL IMAGERY AND MAPPING AGENCY MAPPING, CHARTING AND GEODESY UTILITY SOFTWARE ENVIRONMENT (NIMAMUSE) FUSION V2.1

Prepared for:
The National Imagery And Mapping Agency (NIMA)
Prepared by:
Naval Research Laboratory (NRL) Code 7441
Jerry Landrum (228) 688-4613
Susan Ramsey, Planning Systems Incorporated

1 SCOPE

1.1 Identification

The National Imagery and Mapping Agency Mapping, Charting, and Geodesy Utility Software Environment (NIMAMUSE) application program, Fusion Version 2.1.

1.2 System Overview

1.2.1 Introduction to NIMAMUSE

NIMA has developed NIMAMUSE to provide utilities for access to NIMA digital map data products and to perform standard datum transformations and coordinate conversions.

1.2.2 Introduction to Fusion

Fusion is one of the major applications in NIMAMUSE. It produces digital maps by fusing vector and raster map data layers together. A single raster map serves as a base layer, while user-selected vector features in other layers are overlaid on this base. A user-designed annotation layer can also be laid on the constructed map. After all layers of the map are assembled and crafted to the desired appearance, Fusion freezes the layers together into a new, single raster map object that can be printed, or saved to a file for distribution or for use as input into other applications.

1.3 Document Overview

1.3.1 Purpose

This document serves as the software requirements document for NIMAMUSE Fusion V2.1.

1.3.2 Security

This Fusion V2.1 Software Requirements Specification is unclassified.

2 REFERENCES

Defense Mapping Agency, *Datums, Ellipsoids, Grids, And Grid Reference Systems,* DMA TM 8358.1, September 1990.

3 FUSION V2.1 REQUIREMENTS

Fusion V2.1 should error terminate gracefully; that is, it should detect conditions which force termination and display an explanatory error message before exiting. This is the Stability Requirement, which is applied to each Functional Requirement.

The Fusion V2.1 Functional Requirements are listed below:

3.1 Map Document Files

The user must be able to access and save map documents (*.map files) in the computer file system in the following ways:

3.1.1 Create new map

3.1.1.1 Open new window initialized with default values on program startup.

3.1.1.2 Open multiple new map windows up to user-entered maximum or memory limit.

3.1.1.3 Manipulate windows as normal for windowing system.

3.1.2 Open and view existing map

3.1.2.1 Choice of path via standard GUI open-file dialog.

3.1.2.2 Open map document window initialized with values from file.

3.1.2.3 Multiple map windows up to user-entered maximum or memory limit.

3.1.2.4 Manipulate windows as normal for windowing system.

3.1.2.5 Open maps created on other NIMAMUSE-supported platforms (portable maps).

Binary map documents should be completely portable; that is, a *.map file created on any supported platform should be playable on any other platform.

3.1.2.6 Open default map on program startup

3.1.3 Close map

3.1.3.1 Detect any unsaved changes to map and prompt user to save map to file before closing.

3.1.3.2 Disable controls and menu items after last map closed.

3.1.3.3 Detect any unsaved changes in all open map files when program is exited..

3.1.4 Save map

3.1.4.1 Save map file with current name and path (one-step operation).

3.1.4.2 Save map file with new name and path via standard GUI open-file dialog.

3.1.5 Revert to last saved version of map, discarding changes since save.

3.1.6 Print map

3.1.6.1 Save map image for import into non-NIMAMUSE software, including file formats TIFF, BMP, and NIMAMUSE Raster.

3.2 Map Data

The user must be able to view and modify the data content of the currently selected map in the following ways:

3.2.1 Add, modify, or remove a map background file

3.2.1.1 Add raster background file via standard GUI open-file dialog initialized with prompt and file name to aid in selection

3.2.1.2 Read and display ADRG, ADRI, ASRP, CAC, CADRG, CIB, CRP, DBDB5, DBDBV, DTED, SRG, USRP, IMAGE, and other NIMAMUSE Raster (*.ras) file formats.

3.2.1.3 Change or remove raster background while maintaining same set of vector overlays.

3.2.1.4 Import and register TIFF images.

Clip to desired map corner points, which are also used for registration. Reprojection of image onto current map display coordinate system not required—user must choose correct system before import.

3.2.2 Access raster products

3.2.2.1 Directly access these NIMA raster or image data products: ADRG, CAC, CADRG, CIB, DTED, DBDB5, MUSE Tiled GeoTIFF, and GTIFF.

3.2.2.2 Provide browse map before importing raster data to aid in locating area of interest.

Use overview image included with ADRG product for ADRG browse map. For non-ADRG raster products, provide browse map consisting of map graticule and world-wide vector file clipped to appropriate extents.

3.2.2.3 Use program's standard location functionality to relocate raster product map after creation.

3.2.3 Add, modify, or remove graticule

3.2.3.1 Initialize new graticule with defaults based on map scale.

Defaults derived from NIMA TM 8358.1, "DATUMS, ELLIPSOIDS, GRIDS, AND GRID REFERENCE SYSTEMS"

3.2.3.2 Modify graticule units, spacing, color, and style.

3.2.3.3 Revert graticule to defaults based on scale after graticule is changed.

Separate handling of major and minor border tics, labels, and graticules in both the latitude and longitude directions, including ability to disable one or more of these. Style for graticule is solid line or various marker types.

3.2.3.4 Remove graticule when desired.

3.2.4 Add, modify, or remove a UTM Grid

3.2.4.1 Display UTM grid with default spacing, colors, and labels based on map scale.

Defaults derived from NIMA TM 8358.1, "DATUMS, ELLIPSOIDS, GRIDS, AND GRID REFERENCE SYSTEMS," including MGRS latitude bands and 100K-km square designations where appropriate.

3.2.4.2 Modify color of UTM grid lines and labels.

3.2.4.3 Remove UTM grid when desired.

3.2.5 Add, modify, and remove vector overlay files

Overlay files are generated by NIMAMUSE VPF_IMPort program or other program that generates a NIMAMUSE VEC file.

3.2.5.1 Add vector overlay file via standard GUI open-file dialog initialized with prompt and file name to aid in selection.

3.2.5.2 Modify drawing order of multiple vector overlay files.

3.2.5.3 Assign and modify the symbology of vector overlay files.

See "Edit Symbology".

3.2.5.4 Change timer value for map scrolling by timed overlay.

3.2.5.5 Suppress display of vector overlay without removing it from list.

3.2.5.6 Give vector overlay file a descriptive name.

3.2.5.7 Vector overlay files may be either ASCII or binary.

See "Select vector overlay file format".

3.2.5.8 Remove vector overlay file when desired.

3.2.6 Add, modify, or remove a RDBMS query to ODBC data sources (Win32 only)

Sources are configured using the ODBC Administrator program (not a NIMAMUSE component).

3.2.6.1 Choose RDBMS data source from list of available data sources.

3.2.6.2 Display tables for selected RDBMS data source.

3.2.6.3 Load a file of SQL queries created using any text editor.

3.2.6.4 Display SQL query names for data source and show query syntax for selected query name.

3.2.6.5 Execute selected SQL query. Executing "Draw" query displays table features on map.

3.2.6.6 Test connection to ODBC datasource.

3.2.6.7 Enable/disable map tools for editing RDBMS data source.

See "Select settings for RDBMS" .

3.2.6.8 Use program's map tools to interactively edit RDBMS data source.

Add, select, move, delete, and change symbology of features, automatically encoding tool operations into SQL queries.

3.2.6.9 Select feature types to support before creating new RDBMS table.

3.2.6.10   Create RDBMS tables containing point, line, area, text, range ring, and/or waypoint features.

3.2.6.11   Provide text edit form for displaying/modifying attributes of RDBMS data records.

Initialize form with attribute names and values for selected record. View attributes of other records in table. Choose attributes to be displayed in form, with "form query" that determines which columns from data tables to show. Form can be toggled between read-only or user-editable--See "Select settings for RDBMS".

3.2.6.12   Support RDBMS route planning by automatically redrawing and renumbering line segments after route is edited.

Route (table of waypoints) on map always displays current database contents. Redraw lines and renumber as needed when waypoint is appended, inserted, moved, deleted .

3.2.6.13   Toggle between using map tools for RDBMS Query and annotation editing (Win32 only).

3.2.6.14   Remove RDBMS query when desired.

3.2.7   Add, modify, or remove views of VPF products

Configure view of VPF data containing any combination of VPFdatabases, libraries, coverages, and features, defining what data will be selected for display and how it will be ordered and symbolized. Automatically reload data from VPF product when map location is changed using program's map location functionality.

3.2.7.1   When adding, locate VPF Database Header Table (dht) file via standard GUI open-file dialog.

3.2.7.2   When adding VPF view, display list of all libraries in selected database.

3.2.7.3   Configure view of VPF data:

3.2.7.3.1   Add VPF database, providing dialog to locate dht file.

3.2.7.3.2   View list of all VPF databases already added to data.

3.2.7.3.3   Remove VPF database.

3.2.7.3.4   View list of all libraries in current VPF database already added to data.

3.2.7.3.5   Add a VPF library, displaying list of libraries from current VPF database that are not yet in view.

3.2.7.3.6   Delete a VPF library.

3.2.7.3.7   View and select from list of coverages in current VPF database and library.

3.2.7.3.8   View and select from list containing description and expression of themes in current VPF coverage.

Multiple selections allowed. One-step operation to select or deselect all themes.

3.2.7.3.9   View and modify symbology associated with each VPF theme.

 See "Edit Symbology."

Expression is where clause used in data extraction process

3.2.7.3.10   View, select from, and rearrange drawing order of separate list containing only chosen VPF themes.

List is initially arranged in the order of selection

3.2.7.3.11   Create new VPF theme and add to list.

View and select from lists of databases, libraries, coverages, and feature classes, as described above. View and modify description, expression, and symbology of selected feature. Expression modification automated via expression builder that displays lists of valid "where clause" components (attribute labels, operators, and attribute values).

3.2.7.3.12   Modify existing VPF theme.

4

Functionality as for adding theme, except display name of current databases, library, coverage, and feature class instead of displaying lists.

3.2.7.3.13 Delete existing VPF theme.

3.2.7.4 To aid in locating area of interest, display browse map constructed from Library Reference coverages of all VPF libraries in view.

3.2.7.5 Modify VPF View

3.2.7.6 Display VPF feature attributes on demand

See "Spatial Query for VPF features".

3.2.7.7 Reload all VPF components, clipping to extents of current map.

Enhance performance by removing unwanted VPF data.

3.2.7.8 Remove VPF View

3.2.8 Add, modify, remove, and measure annotations

3.2.8.1 Add points, lines, text, rectangles, range rings, polygons to map.

3.2.8.1.1 Allow choice of methods for positioning new annotation features.

See "Select method for positioning new annotations".

3.2.8.2 Select annotations to be moved, deleted, or edited.

After selection, mouse and keyboard controls are used to move, delete, or mark annotations for action by other tools. Multiple selections allowed.

3.2.8.2.1 Move point and text annotation features, and vertices in line features, via point-entry dialog.

3.2.8.3 Aggregate annotation line features into single line feature or into area feature.

3.2.8.4 Set anchor point for range bearing measurement.

Show range and bearing from the anchor point to the cursor.

3.2.8.5 Assign map tool functionality to the annotation layer (Win32 only).

3.2.8.6 Assign map tool functionality to the ODBC query layer (Win32 only).

3.2.8.7 Edit symbology

3.2.8.7.1 Allow choice between VPF and non-VPF symbol sets.

See ""Select Symbology" in "Map Settings" section.

3.2.8.7.2 Modify symbol style and color of existing point, line, area, and text features.

Whether or not certain symbol characteristics can be edited depends on the feature type. Disable characteristics that can not be edited.

3.2.8.7.3 Set default symbology to be applied to all future annotations.

3.2.8.7.4 When editing symbology, move directly to desired symbol in list of available symbols by entering its index (position in the list).

3.2.8.8 Measure selected features

3.2.8.8.1 Display latitude and longitude in user-chosen units for point and text features.

3.2.8.8.2 Show latitude and longitude of endpoints, and distance and azimuth between points, in user-chosen units for line features.

3.2.8.8.3 Show area in both sperical degrees and user-chosen units for area features.

3.2.8.8.4 When airspace volume measurement functionality is enabled, prompt for desired lower and upper altitudes, and display volume above area feature, in user-chosen units.

See "Select measurement options" and "Select units of measure."

3.2.8.9 Spatial query for VPF features

3.2.8.9.1 Display VPF attributes for selected VPF feature, including database, library, coverage, and feature class names.

3.2.8.9.2 Display detailed measurements of VPF features when that setting is selected, in user-chosen units.

See "Select measurement options" and "Select units of measure."

3.2.9 Control input and output of data for annotation editor.

3.2.9.1 Save current annotations into NIMAMUSE VEC file.

Files may be either ASCII or binary (see "Select vector overlay file format").

3.2.9.2 Open existing NIMAMUSE VEC file.

3.2.9.3 Clear annotation editor of all data

Data need not be recoverable if it has not been saved.

3.2.10 Save map image into file format suitable for exchange with other programs.

3.2.10.1 Export map image as a bitmap (*.bmp), NIMAMUSE raster file (*.ima), or TIFF file (*.tif).

3.2.11 Fuse map overlays into basemap image.

Move all map overlays into the raster background image (automatically remove overlays from map after fusion).

3.2.12 Display palette.

3.2.13 Toggle display of annotations (off and on) in one step.

3.2.14 Constantly display cursor position, program status, and data (when applicable).

3.2.14.1 Display geographic location at cursor position in user-selected cursor coordinate system

See "Set attributes for map cursor".

3.2.14.2 Display abbreviation for horizontal datum associated with cursor coordinate system.

See "Set attributes for map cursor".

3.2.14.3 If map has raster background that associates data with each cursor position, display data in user-selected units.

See "Add, modify, or remove a map background file" and "Select units of measure."

3.2.14.4 Display message describing progress of operations.

3.3 Map Location

The user must be able to view and modify the location, scale, and size of the currently selected map in the following ways:

3.3.1 Reload VPF and Raster Product Data automatically from product as location is changed.

3.3.2 Double map scale in one-step operation (zoom in).

Use pixel replication if necessary.

3.3.3 Reduce map scale by one half in one-step operation (zoom out).

Use pixel down-sampling if necessary.

3.3.4 Reload raster product at product's original scale.

If raster product is present, reset zoom factor so that each pixel or data value will be represented by exactly one pixel in the map display.

3.3.5 Reset map to maximum geographical area in one-step operation.

Reset map area to entire part of the world for which map display coordinate system is valid (zoom out to maximum

coordinate system limits).

3.3.6 Select new map center via mouse click, point-entry, or timed overlay file.

Pick new center by clicking mouse on map, by entering point into text field in point-entry dialog, or by re-centering on the first annotation in an overlay file with a non-zero timer.

3.3.7 Sweep out new map area.

Sweep out desired area with mouse and zoom in to swept area.

3.3.8 Set map image size, geographic extents, center, and/or scale.

3.3.8.1 Provide several different methods for defining map parameters.

Methods differ based on which parameters are known and which are to be computed. Provide at least these three:

3.3.8.1.1 Enter center, scale, image size; compute geographic extents at sides of map.

3.3.8.1.2 Enter corner points of map, and scale; compute center, image size.

3.3.8.1.3 Enter geographic extents and size; compute map center and scale.

3.3.8.1.4 For entry of extents and points, provide point-entry dialog.

3.3.8.1.5 Allow choice of pixels, centimeters, or inches for entry/display of image size

3.3.8.1.6 Allow new parameter values to be examined via preliminary computation before map is redrawn.

3.3.8.1.7 Provide drop-down list of common map scales.

3.3.9 Reset map area to selected vector overlay file.

3.3.9.1 Reset map area to vector overlay file's extents in one-step operation if only one overlay file is present.

3.3.9.2 Select desired vector overlay from list if more than one file is present.

3.3.10 Reset map area from VPF-coverage browse map when a VPF View is present.

3.3.10.1 Provide several methods for using VPF-coverage browse map and modifying map setup:

3.3.10.1.1 Relocate map by clicking new center or sweeping out area on VPF-coverage browse map, or keep same location.

3.3.10.1.2 Scale map by using default VPF product scale or choosing from list of common scales.

3.3.10.1.3 Change map size in pixels.

3.3.10.2 Allow the display of the VPF relocation dialog to be suppressed.

3.3.11 Reset map area from browse map that shows coverage of raster product data.

3.3.11.1 Provide several methods for using browse map and modifying map setup (as in description for VPF above).

3.3.12 Scroll map area by timed vector overlay

Reload vector overlay file and move map center to the position of the first point feature that has a timer set.

3.3.13 Scroll map area by dead reckoning

Functionality is for demonstration purposes only and is not intended to support navigation.

3.3.13.1 Move map center according to a user entered speed and direction.

3.3.13.2 Reload raster and VPF product data as needed.

3.3.14 Limit location changes when map background is from raster file.

3.3.14.1 Disable location changing via new center, sweep, maximum zoom out, vector file extents, and VPF browse map.

3.3.14.2   Make relocation dialog (for setting map image size, geographic extents, center, and/or scale) read-only.

3.3.14.3   Use pixel replication/pixel down-sampling to allow a limited amount of zooming in/out.

3.4 Map Settings

The user must be able to modify various map settings in the following ways:

3.4.1   Associate user-entered information with map

3.4.1.1   Supply text edit area for entering user information.

3.4.1.2   Display basic attributes of map as read-only text in window.

Scale, coordinate system, horizontal datum; basemap and VPF product information when relevant.

3.4.2   Select map display coordinate system

Allow choice of coordinate system (projection, horizontal datum, geographic area, and units) used to draw map image.

3.4.2.1   Choose from list of common predefined coordinate systems suitable for use as map display systems.

Systems like UTM and MGRS are not considered to be "drawing systems" and are unsuitable for use as map display coordinate systems.

3.4.2.2   Allow option of changing map cursor coordinate system to new map display system.

3.4.2.3   View parameters of selected coordinate system.

3.4.2.3.1   Parameters that are not applicable to current coordinate system have disabled controls.

3.4.2.4   Create new user-defined coordinate systems.

3.4.2.4.1   Predefined coordinate systems can not be edited, and every system must have a unique name.

3.4.2.4.2   User-defined coordinate systems are displayed in a separate list, and can be deleted from the list and file.

3.4.2.4.3   User-defined coordinate systems are automatically saved to file.

3.4.2.4.4   User-defined coordinate systems can be deleted from the list and file

3.4.2.4.5   Controls for choosing units of measure and projections for user-defined coordinate system are lists of predefined items.

Units list contains angular units for Geodetic Position systems; linear units for all other systems.

3.4.2.4.6   Choosing a new projection for user-defined coordinate system enables/disables or re-initializes projection-dependent controls.

3.4.2.4.7   Control for horizontal datum selection for user-defined coordinate system invokes new window with list of common predefined horizontal datums.

See "Select Horizontal Datum."

3.4.2.4.8   When creating coordinate system, reset button restores all parameter values to the defaults .

3.4.2.5   Select horizontal datum

3.4.2.5.1   Window for viewing current datum's parameters displays name, area/country, datum translations, and ellipsoid.

3.4.2.5.2   Window for viewing current ellipsoid's parameters displays name, semi-major axis, and reciprocal of the flattening.

3.4.2.6 Disable map display coordinate system selection when raster file or product background is present.

3.4.3   Select monitor settings

3.4.3.1   Calibrate map image to hardware monitor by adjusting map geometry to actual pixel size.

3.4.3.2   Select monitor's color setting (Win32 only).

3.4.4   Select units of measure

3.4.4.1   Display lists of standard units for horizontal linear, vertical linear, area, volume, and azimuth/bearing measurement.

3.4.4.2   Apply selected units to feature measurement and display of map data.

3.4.5   Select default working directory for current map

3.4.5.1   Display standard GUI open-file dialog for choosing directory.

3.4.5.2   Open-file and save-file dialogs for current map are initialized to working directory.

3.4.6   Set attributes for map cursor

3.4.6.1   Select coordinate system for display of spatial position of cursor and measurement tool points.

See "Select map display coordinate system". Selection of cursor system differs from selection of map display system only in that the list of predefined cursor systems contains additional systems like UTM and MGRS which are suitable for use as map cursor system.

3.4.6.2   Display form tailored to cursor coordinate system for all point entry operations.

3.4.6.2.1   In point-entry dialog, tailor edit controls to cursor system and initialize with reasonable values.

3.4.6.2.2   In point-entry dialog, reject most invalid characters and detect out-of-range errors as much as possible.

3.4.6.3   Select cursor style from arrow symbol, plus symbol or cross symbol.

3.4.7   Select measurement options

3.4.7.1   Toggle display of VPF feature measurement.

Enable/disable display of detailed measurements of VPF features in the spatial query window that also displays VPF feature attributes.

3.4.7.2   Toggle display of airspace volume.

Enable/disable display of airspace volume above area features, in both the spatial query window for VPF features and the measurement window for annotation area features.

3.4.8   Select terrain rendering, palette, and map resetting options for raster basemaps

3.4.8.1   Select terrain colors for digital elevation data in color look-up table.

Terrain color look-up table defines color scheme used to render digital elevation data including DBDB5 and DTED.

3.4.8.1.1   Assign hue, saturation, and value to up to six data ranges in color look-up table.

3.4.8.2   Select sun position for raster backgrounds that have associated data from eight compass positions, or remove shading for sun position.

If data source is DTED or DBDB5, simulate hill shading for selected position.

3.4.8.3   Provide option to display key to terrain colors on map.

3.4.8.4   Select palette colors option:

3.4.8.4.1 Provide "colors only" palette option.

Basemap colors are chosen from the color section of the default color palette.

3.4.8.4.2 Provide "grays only" palette option.

Basemap colors are chosen from the gray section of the palette.

3.4.8.4.3 Provide "both colors and grays" palette option.

Basemap colors are chosen from both the RGB and the gray sections of the palette.

3.4.8.4.4 Provide native raster palette option

For basemap images that have their own 2 and 4 bit color palettes such as those imported from CRG.

3.4.8.5 Toggle display of window that provides options for resetting map using raster product browse map.

3.4.9 Select vector overlay file format

3.4.9.1 Allow choice of ASCII or binary format for overlay file and annotation file input and output.

3.4.10 Select settings for RDBMS (WIN32 only)

3.4.10.1 Set valid RDBMS editing options

3.4.10.1.1 Allow separate enabling/disabling of editing options (select, move, delete, create) for RDBMS features.

3.4.10.1.2 Toggle form that shows RDBMS feature's attributes between read-only and user-editable.

3.4.10.1.3 Provide options that enable or disable all the RDBMS editing options listed above in one step.

3.4.10.2 Set supported feature types for new RDBMS table

3.4.10.2.1 Enable/disable support for adding point, line, area, text, range ring, and/or waypoint features to new RDBMS table.

3.4.10.2.2 Provide options that enable or disable all the RDBMS table contents options listed above in one step

3.4.11 Select attributes for VPF View

3.4.11.1 Toggle caching of VPF feature class data.

Allow enabling/disabling of option to save data for feature classes that are not currently being displayed

3.4.11.2 Select buffer size for loading VPF data from area either same size as, or 1.5 or 2 times larger than the map area.

Provide choice of three buffer sizes. Smallest loads only enough data for current map. Larger sizes load extra data so that map can be re-centered without reloading data.

3.4.11.3 Toggle display of window that provides options for resetting map using VPF-coverage browse map.

3.4.11.4 Provide option to thin equivalent VPF text features.

3.4.12 Select Symbology

3.4.12.1 Choose between VPF symbol set and other, non-VPF symbol set for support of tactical overlays, etc.

3.4.13 Select method for positioning new annotations

3.4.13.1 Allow choice between positioning new features with mouse alone, or with mouse and point-entry dialog(s).

3.4.14 Select image processing option for CIB raster product

3.4.14.1 Provide CIB image enhancement by linear stretch.

Stretch the CIB pixel intensity range linearly over the gray scale palette, providing contrast enhancement.

3.4.14.2 Provide three options for CIB image enhancement using stretch by standard deviation.

Stretch the mean +/- 2, 3, or 4 standard deviations over the gray scale palette.

3.4.14.3 Provide CIB image enhancement by histogram equalization.

Redistribute CIB intensities such that each value in the gray scale palette gets about the same number of pixels.

3.4.15 Select maximum number of map windows

Display form that prompts for maximum number of map document windows that can be open at one time.

3.4.16 Select full menu or custom menu (WIN32 only)

Use initialization file to determine whether program will have full menu only, customized menu only, or option of using either full or customized menu.

3.4.17 Save settings as defaults

Save settings from any existing map as default values for future maps created using the new file feature.

3.5 Other Requirements

3.5.1 Choose and launch another program while current program is running.

3.5.2 Provide standard window and icon manipulation utilities (WIN32 only).

3.5.3 Provide standard on-line help file

4 ACKNOWLEDGEMENTS

5 APPENDICES

5.1 Appendix A Acronyms

Acronym	Meaning
ADRG	ARC Digitized Raster Graphics
ADRI	ARC Digital Raster Imagery
ARC	Equal Arc Second Raster Chart/Map
ASRP	Arc Standard Raster Product
BMP	Bitmap Graphics Format
CAC	Compressed Aeronautical Chart
CADRG	Compressed ARC Digitized Raster Graphics
CIB	Controlled Image Base
CRP	Compressed Raster Product
DBDB	Digital Bathymetric Database
DM	Degrees Minutes
DMS	Degrees Minutes Seconds
DTED	Digital Terrain Elevation Data
GUI	Graphical User Interface
MC&G	Mapping, Charting, and Geodesy
MGRS	Military Grid Reference System
NIMA	National Imagery and Mapping Agency
NIMAMUSE	NIMA Mapping, Charting and Geodesy Utility Software Environment
RDBMS	Relational Data Base Management System
SRG	Standard Raster Graphics
TIFF	Tagged Image File Format
UPS	Universal Polar Stereographic
USRP	UTM Standard Raster Product
UTM	Universal Transverse Mercator
VPF	Vector Product Format
WGS-84	World Geodetic System 1984